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ABSTRACT

To determine whether the open classroom environment produces a higher degree of internal locus of control than the traditional classroom, 200 seventh-grade students, matched for sex, socioeconomic status, academic achievement, and intelligence, were assigned to either open or traditional classrooms. It was hypothesized that both high and low academic achievers in the open classroom would show greater internal locus of control than their counterparts in the traditional classroom, and that low academic achievers in the open classroom would display higher internality than high academic achievers in the traditional classroom. Pre- and posttest measures of the Nowicki-Strickland Locus of Control Scale were used to investigate the hypothesis and confirmed a higher degree of internal locus of control in the open classroom that crossed levels of academic achievement. (SK)

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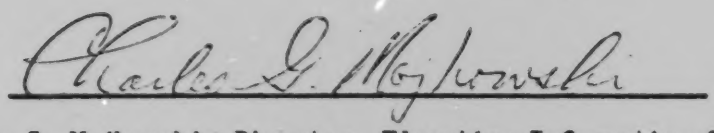
THE EFFECT OF THE OPEN CLASSROOM ENVIRONMENT ON LOCUS OF CONTROL

By

Harriette K. Stone

A. B. Brown University, 1935



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A Dissertation Submitted in Partial Fulfillment of
the Requirements for the Degree of
Doctor of Education

Walden University
July, 1974

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DEDICATION

To my husband, Raymond E. Stone, without whose constant help, encouragement and faith this research would not have been a reality.

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CHAPTER I

INTRODUCTION

From the time of Socrates, Plato and Aristotle to the present day, educators have been faced with the necessity of providing learning for youth in direct response to the demands of the particular times. It is easy to find numerous references throughout history concerning the unsuitability of an existing system of education or to find criticism of methods of education. Aristotle, for example, in challenging the education provided by the sophists of ancient Greece, concluded that "if men were ever to be redeemed from error, intellectual and moral, they must be made to think whole thoughts [Davidson, 1892, p. 10[illegible]]." Aristotle was the first Athenian who undertook the task of imparting a higher education to the youth of Athens (Davidson, 1892).

Historical Background of the Problem

One does not have to search far in current literature to find complaints about the educational system in the United States. Before Sputnik polarized criticism of subject matter content around the field of science, the elements of the controversy between subject matter content and process of learning were not clearly delineated. The success of Sputnik resulted in the up-dating of the area of science in the school curriculum, and a gradual balance between the sciences and humanities was approached (Handler, 1970).

Society continued, however, to make demands that subject matter per se be a major goal of education. Willard Waller (1965) demonstrated this fact when he wrote:

> Teachers are responsible to the community for the mastery of these subjects [their subjects] by their students. The

> political organization of the school, therefore, is one which makes the teacher dominant, and it is the business of the teacher to further the process of teaching and learning which is central in the social interaction of the school [p. 34].

Although demands for content per se have continued, a preponderance of educational criticism has been focused on the process of learning, with subject matter being considered a means of acquiring skills or of developing the thinking processes of a child. John Garrett (1956) wrote:

> At eighteen Americans are intellectually anything from eighteen months to two years behind our young people and at the university they have to make up two years of education which in England they would have done at school [p. 141].

Dorothy Thompson (1958) stated:

> American public education, supposedly the most free in the world, is not cultivating free inquiring minds either among teachers or their pupils. It has settled into a mold of custom [p. 85].

Specifically in the area of skills, Peter Witonski (1973) reported that recent data on pupil achievement in New York City schools as of February, 1972, showed that the percentage of pupils below the national average in reading skills has grown from 54.1% in 1965 to 66.2% in 1971 and that the average reading retardation level increased from two months at the second grade level to almost two years in grades seven through nine. This report supported the argument against the method of teaching reading which was presented by Rudolph Flesch (1965) in his claim that reading was being taught by whole word recognition and by an ineffectual method of phonics.

The Institute for the Development of Educational Activities (I/D/E/A) has reported on a survey conducted in the area of accountability (1970). A system holding teachers and administrators more accountable for the prog-

ress of students was favored by 68% of the parents questioned and by 65% of the high school juniors and seniors. I/D/E/A concluded that the response inferred dissatisfaction with the amount of accountability presently found in the schools.

Entire books have been published on the subject of the failure of the educational system in our public schools. John Holt's Why Children Fail (1970) was filled with condemnations of the educational process. Charles Silberman (1970) generated further controversy with his book Crisis in the Classroom in which all aspects of American education in the public schools were examined and criticized, with notable attention paid to the physical plants. In all of these writings there was the underlying theme that the educational process was not adequately serving the needs of the individuals with whom it dealt nor the society of which these individuals formed an integral part.

To circumvent such criticism of the educational process, great teachers have centered on guiding individuals to develop responsibility for their own learning. The consequence of this approach is that the individual leaves the educational environment, theoretically, with the tools that enable him to continue to learn in his constantly changing society.

Socrates, in the Golden Age of Greece, encouraged the young men who came to him for instruction and tutoring to seek answers to their own questions through observation and reasoning, to develop their own intellectual powers and to aid one another in the process (Davidson, 1892). Rousseau in France followed a similar line of educational philosophy in urging the natural development of the individual child through his own

interests and curiosity concerning his natural surroundings (Rousseau, 1723). Maria Montessori (Standing, 1962), through her work in the educational development of children in Italy, urged a more permissive type of instruction in which a child follows his interests and desires in developing himself, guided along general lines by adult supervision. In addition to the support and refinement of Rousseau's philosophy by Montessori, John Dewey, the father of today's public school educational principles in America, stated:

> Let the child's nature fulfill its own destiny, revealed to you in whatever of science and art and industry the world now holds as its own [Dworkin, 1959, p. 111].

Thus, the great educational leaders of many societies, many countries and many times have recognized the fundamental importance of developing the individual to the limits of his potential.

Society has also been calling for the same objective of full potential development, but in a different vocabulary and in a different context than the professional educators. Benjamin Willis, Chairman of the Education Policies Commission of the National Education Association (1961), has observed about the demands of society:

> The basic American value, respect for the individual, has led to one of the major charges which the American people have placed on their schools: to foster that development of individual capacities while will enable each human being to become the best person he is capable of becoming [p. 1].

The turmoil of world events since the conclusion of World War II has seen a demand in America for education that is relevant and personally satisfying. The rise of American youth as a questioning force, seeking and pressing for answers to social problems, has been one of the important factors causing educators to scrutinize the processes of public schools.

Silberman's writing has spawned books and articles, many of which supported his statement that today's public schools are often "grim" and "joyless." James Herndon (1970) and John Holt (1971) have questioned the efficacy of present teaching methods, arguing that instruction in subject matter is far less important than the development of the whole individual.

One of the goals in developing the full potential of an individual is to develop within that individual a sense of responsibility for his own continuing learning (Dewey, 1943). In arguing for a radical departure from the traditional system of education, critics such as Holt, Herndon and Silberman have averred that a sense of self-responsibility, or the control of an individual over his own learning, is absent in the traditional classroom because of its authoritarian atmosphere.

Such criticism has raised questions which demand answers from the educators. Among the questions is the prime one of emphasis on traditional methods of teaching. Should subject matter, with all kinds of sources of information so much more easily available to so many more individuals in today's society, be the most important part of the educational process? Should the development of an individual's potential take precedence over content material? Is modern society, as A. S. Neill (1960) claimed, producing mass humanity through its educational process? How much emphasis is there in our schools on the development of reasoning, thinking and decision-making? Should, in fact, the stress in our schools be on learning rather than teaching? The questions seem endless.

The fact is clear that the results of traditional public school education are being challenged by the demands of society in today's culture and by society itself. In the process of making this challenge,

society is compounding the problem of answering it by its attitude towards any radical departure from the traditional methodology. Spinkler (1955) reported in a survey of attitudes and opinions concerning education in a changing American culture that the general public and parents tended towards the traditional values in education while the younger teachers and many students were pressing for values that the transforming culture was producing. Vivian Richman (1972) addressed the same attitude in warning that a radical departure from what they have been doing would require a commitment to an idea and a willingness to risk, to try something different, on the part of both school personnel and parents. In a summary of open education as a drastic shift from the traditional classroom, Richard Herlig (1972) stated:

> Whatever the interpretation of the open approach, it is going to be subject to parental concern in America, particularly regarding competence in academic skills . . . . Some parents even wonder whether learning in a school that children seem to enjoy can possibly be organized enough to be effective. A common question relates to structure [p. 8].

In spite of the skeptical attitude towards any great digression from traditional education which society has manifested, that same society has posed for the professional educators the same problem: how can the educational process in the public schools develop the individual to his fullest potential?

Perspective for the Problem

Educators have not been inactive in attempting reform and facing issues relevant to improving and adapting the educational system to the demands of the present times. The fifties and sixties gave a great deal of attention to curriculum reform and new teaching methods. This in-

volved innovative instructional equipment such as language laboratories as a radical change in methodology. School architecture was revised to produce a campus-type school, thus making changes in the physical composition of public education. These efforts, however, proved to be only piecemeal methods of reform and often gave only lip service to change, with the traditional methods of teaching being kept in use in many instances (Boulding, 1971; Education Development Center, 1971). During the past five or six years radical approaches to education have been taken, among which have been such experiments as the "free schools," "open schools," "schools without walls," or "schools as learning headquarters" (Boulding, 1971). These early efforts to shift away from traditional education, while not always successful, were indicative of the search for new ways to develop students to their maximum potential.

Currently one of the most promising alternatives to traditional public school education is the program of open education, or the open classroom, based on the British Infant School program and often referred to in terms of "I, Thou and It." Buber, the distinguished German philosopher, stated the terminology of "I, Thou and It" as a relationship and as an inter-relationship:

> Man travels over the surface of things and experiences them. He extracts knowledge about their constitution from them. He wins an experience from them . . . . But the world is not presented to man by experiences alone. These present him only with a world composed of <u>It</u>. As experience the world belongs to the primary word <u>I-It</u> relationship . The primary word <u>I-Thou</u> establishes the world of relation interrelationship [Buber, 1958, p. 23].

David Hawkins (Silberman, 1970) used the relationship identified by Buber in defining the teaching-learning process of the open (informal)

classroom as a triangular relationship of child, teacher and stuff ("stuff" being the terminology used in the British Infant School system for the variety of materials in use). A full discussion of the open classroom appears in Chapter II. It is, however, primarily an environment in which a guide and a learner follow the learner's interests and activities in acquiring, developing and applying learning. Among the purposes of the open classroom environment is the individualization of learning to fit the specific needs of each child, as well as the acceptance by the child of the responsibility (or control) for selecting those situations in which he develops his learning processes through pursuing his own interests and activities.

The theory behind the open classroom approach is concerned with the development of the full potential of the individual. The environment is thus a child-centered milieu in which the student proceeds from the investigation of the concrete in his universe to the abstract, using the child's own interest as the starting point (Featherstone, 1971; Rogers, 1972). This concept of learning based on the individual's own interests and proceeding from the concrete to the abstract was demonstrated by Piaget, a leader in the field of child development.

Piaget showed that children see themselves as the center of their universe and that the child's perception of his universe is an important factor in determining his behavior (Piaget, 1922). His work also demonstrated that children have a strong belief in causal relationship—that is, that the action of an individual can produce or modify an experience (Furth, 1970). Rotter has restated this perception of causal relationship in a slightly different manner in his theory of social learning.

He has identified the concept as locus of control and defined it as the location of the force within the environment which the individual perceives to be responsible for the outcome or development of an experience. Rotter identified two types of control—internal and external, operating along a continuum. When the locus of control is internal, the individual perceives himself as a prime causal factor in determining events in his environment. When the locus of control is external, the individual perceives forces outside of himself as prime factors in determining these events. High internal control, for example, does not mean that an individual never experiences failure, but rather that, in failure, he accepts himself as a prime cause of that failure. Thus locus of control is a concept that is operative for both positive and negative events in an individual's environment.

It has been reported that an English reviewer found nearly a thousand studies involving locus of control (Nowicki, 1973). In the research concerning this concept, investigations by Crandall (1965), Beebe (1970), Shaw and Uhl (1971), Strickland and Nowicki (1971), for instance, have been among the more recent studies involved with the relationship of locus of control to various elements of academic achievement or to the learning environment. It has been shown that individuals with higher internal locus of control have higher scores on academic achievement tests, demonstrate better social adaptability and manifest other competence-behavior modifications such as a greater ability to delay gratification (Nowicki-Strickland, in press). Clearly then, factors which favor the development of internal locus of control in students are desirable from both the educational and societal points of view.

Statement of the Problem

As has been stated, the basic problem underlying this research was that of identifying and assessing learning environments as they relate to the development of student self-direction. Unless the educational process can maximize the child's ability to initiate learning and take responsibility for his actions, post-school, as well as in-school, experiences will be less than optimal. The open learning environment proposed by many educators and knowledgeable writers is based on a philosophy which is compatible with the rationale supporting the theory of locus of control. Research is needed to empirically test this perceived compatibility.

Purpose of the Study

Assuming that students with an internal locus of control will continue to be self-directed and thus continue to develop their potential, the purpose of this study was to determine if a particular learning environment could foster the development of this self-direction. Should a particular environment be of value in developing more positive (internal) locus of control, then our educational systems could better respond to current criticisms.

Since one important current interest in educational approaches to learning centers around the open classroom as a promising departure from the traditional approach, this study was undertaken specifically to ascertain the value of the open classroom environment on one particular aspect of development of potential—that of developing self-direction through affecting the degree of internal locus of control.

The study also attempted to ascertain if the open classroom environment produced a statistically significant higher internal locus of control across levels of academic achievement.

To accomplish the aims of the investigation, the following major hypothesis was formulated:

1. Students in the open classroom show a statistically significant higher degree of internal locus of control than students in the traditional classroom.

The following sub-hypotheses were also formulated:

1. High achievers in an open classroom show a statistically significant higher degree of internal locus of control than high achievers in a traditional classroom.
2. Low achievers in an open classroom show a statistically significant higher degree of internal locus of control than low achievers in a traditional classroom.
3. Low achievers in an open classroom show a statistically significant higher degree of locus of control than high achievers in a traditional classroom.

While the major hypothesis focuses on the classroom environment, the sub-hypotheses are directed at more specific questions based on relationships between locus of control and achievement which have been reported in previous research. For the purpose of this investigation, locus of control was defined as a score on the Nowicki-Strickland Locus of Control scale. Achievement was defined as scores on the Iowa Test of Basic Skills subtests for language and mathematics.

Definitions

Locus of Control - the degree to which an individual perceives that reward follows from or is contingent upon his own behavior or attributes versus the degree to which he feels that reward is controlled by forces outside of himself and may occur independently of his actions. For the purposes of this study locus of control scores were determined by the Nowicki-Strickland Locus of Control scale (See Appendix C).

Internal Locus of Control - the degree to which a person perceives that an event is contingent upon his own behavior or his own relatively permanent characteristics.

External Locus of Control - the degree to which a person perceives that reinforcement follows some action of his own but is not primarily contingent upon his own actions and is rather the result of luck, chance, fate, as under the control of powerful others or as unpredictable because of the great complexity of forces surrouding him.

Academic Achievement - an area of achievement showing competence of performance in an academic subject. For the purposes of this study academic achievement was operationally defined as the achievement scores in mathematics and language as measured by the subtests of the Iowa Test of Basic Skills.

High Achievers - for the purposes of this study operationally defined as those students whose Iowa test scores in language and mathematics were above the median of those in the open classroom environment and of those in the traditional classroom environment.

Low Achievers - for the purposes of this study operationally defined as those students whose Iowa test scores in language and mathematics were below the median of those in the open classroom environment and of those in the traditional classroom environment.

Open Classroom - a learning environment in which the learner assumes through his own interests a large measure of responsibility for his own learning with the teacher acting as a guide and as a resource person aiding the learner in his activities. The open classroom in this study was operationally defined as a learning environment containing essentially four experienced teachers in the four basic academic disciplines of English, mathematics, science and social studies, all of whom acted as resource persons and guides for the learner as he pursued his learning activities, but who also instructed these students in small groups as the need arose, without conforming to the school time schedule.

Traditional Classroom - a self-contained classroom with one teacher in one academic discipline, using a scheduled amount of time to teach a prescribed curriculum with time-honored methods, in a teacher-dominated atmosphere.

Learning Environment - the setting and atmosphere in which a student learns under certain physical and mental conditions. In this study the learning environment referred to the traditional classroom conditions and the open classroom conditions.

Limitations of the Study

The concept of the open classroom must, of necessity, be so generalized that its implementation in the United States produces many

variations. This study dealt with just one model of this concept—that of a basic team of teachers who formed an interdisciplinary unit and who covered basic curriculum goals in their respective fields, with the main difference between the traditional classroom teaching and the open classroom teaching being in methodology and atmosphere. The model of the open classroom in the study is described in detail in Chapter III.

Since the population from which the sample was drawn was limited to middle-class socio-economic groups of Caucasians, the study was concerned with this segment of the population. Since teachers had been previously assigned to these classes, there was no means of control for teacher differences in such areas as personality, interests or physical differences. However, there was commonality among teachers in such features as type of college background, experience in the teaching field, and length of time teaching in the particular school.

The study was conducted over the period of one school year in a school which starts with the seventh grade. Therefore, the students in the sample had been assigned to these two types of classrooms during the previous spring prior to their entrance into the school. Thus, the opportunity to randomly assign students to these two environments was not available. Statistical procedures for controlling such limitations are described in Chapter III.

Lastly, the conclusions reached are, due to the specific population involved, limited to that particular segment of the entire school population. It is clear that other factors such as race or culture could influence conclusions for a more generalized school population.

Summary

A selected overview of the concepts in educational philosophy from which the open classroom evolved and of the concepts in childhood development which led to the evolution of the theory of locus of control was presented. These concepts provided the framework for the problem under study—namely, the effect of two types of education environment, the open classroom and the traditional classroom, on students' locus of control. The hypotheses tested sought to determine whether a particular environment, the open classroom, affected a more positive internal locus of control. The study also endeavored to ascertain if correlations existed for both high and low achievers in the open classroom with internal locus of control. Should this particular environment, the open classroom, prove valuable for a particular group of students, then educators could utilize this environment in school systems. The composition of the sample, composed of seventh graders from a middle-class socio-economic background, and the inability to assign subjects randomly to the types of classroom included in the study constituted the major limitations of the study.

CHAPTER II

REVIEW OF THE LITERATURE

Evaluations of formal public school education today contain a great deal of criticism concerning the effects of schooling upon individuals. Critics are saying that a knowledge of subject matter without such knowledge being utilized for the modification of an individual's behavior is of little or no value to either the individual or to society. Harold Full (1967) stated:

> It the school is the one social institution, outside the family, that comes into any significant relationship with practically the entire population . . . . The school is under tremendous pressure from an ever-changing society to become a more meaningful influence in the lives of today's youth [p. 59].

Research by behavioral scientists such as Phares (1955), James (1957), Bialer (1961), Chance (1965) and Coopersmith (1967) appeared to give strong support to such criticism. Piaget, the eminent Swiss psychologist, has provided two of the bases for questioning the development of our traditional educational system in his proposal that children have a belief in causal relationship and in his theory of the egocentricity of children. Causal relationship is one in which the child sees some action of his own as producing or modifying an experience, primarily because he sees himself as the center of his universe. This perception of himself by the child has been termed the child's egocentricity by Piaget and has been demonstrated by him in several experimental situations (Furth, 1970).

In addition to the questioning by such eminent persons as Admiral Rickover (1963) with his condemnation of the American educational system, Postman (1969) with his indictment of teaching, and Max Rafferty (1970)

with his charges of the inefficacy of the learning situation, professional educational critics such as Silberman (1970), Herndon (1968) and Dennison (1969) have concerned themselves with various facets of dissatisfaction regarding the public school system. All of them reached the same conclusion, which Holt (1969) summed up in his basic criticism: "Everything we say or do in schools tends to separate learning from living, and we should try instead to join them together [p. 205]."

When one looks back at the history of the American public school system, one finds that the emphasis in education through World War I had been on subject matter and other factual information such as retention of facts through memory training. These were an outgrowth of the old "three R's," and all children received a common basic instruction in the educational system of the United States. However, because sources of information became more easily available after the conclusion of the war, the need for subject matter retention by the individual began to lessen. This lessening has continued at a more rapid rate with the advent of the technological age.

Although in the 1920's the progressive ideas promulgated by Dewey and Montessori received the attention of a segment of educators, widespread implementation of their ideas did not take place until the 1960's and 1970's. The last two decades have seen greatly increased availability of information through the development of space age science such as Telstar, for example, and a resulting decrease in the need of individuals to remember large quantities of factual information. Therefore, with the implementation of the progressive ideas of Dewey and Montessori, with the impetus provided by Piaget's proposals, with the increased interest in

behavior modification as an educational goal and with the societal demand for more effective education, administrators and teachers have been engaged in re-evaluating curricula and methods in terms of present and future needs and requirements.

Locus of Control

In this re-evaluation process, one of the basics in education which has had the attention of professionals is the learning process itself. There has been a clearly defined need to understand thoroughly this process and all of its characteristics and potential impact. Thus, the role of the researcher has become increasingly important in education, as research has turned to the problem of delineating this process. As a result of this concern, Piaget's work has received major attention, particularly as it has related to the learning process. His theory that children learn best from their own experience and from their own interests has sparked many studies of the concept of self and its components, such as self-image or concept and self-responsibility. In the area of self-responsibility the idea of control is inherent, and this concept of control has become one of prime interest, particularly in its relationship to the classroom. The role of this concept has been the subject of numerous investigations, all of which provide insight into possibilities of change in our educational methods and curricula.

In a study of motivational and ability determinants of young children's intellectual achievement behaviors, Crandall (1962) stated:

> One of the 'theory-dictated predictor variables employed' was the children's conviction that they, rather than other persons, are the major cause of the reinforcements that followed their intellectual achievement performances [p. 644].

This perception of control as a variable in the classroom was confirmed

in the development and testing of the Children's Picture Test of Internal-External Control (IE) (Battle & Rotter, 1963) from which it was concluded that perceived control is one of the useful variables in intellectual achievement.

One of the factors studied has been the locus (or site) of this perceived control—whether internal or external (IE). Rotter (1966) had defined locus of control as:

> the degree to which an individual perceives that (the) reward follows from or is contingent upon his own behavior or attributes, versus the degree to which he feels the reward is controlled by forces outside of himself and may occur independently of his own actions [p. 11].

He continued with a definition of external control:

> When reinforcement is perceived by the subject as following some action of his own but not entirely contingent upon his action, then, in our culture, it is typically perceived as the result of luck, chance, fate, as under the control of powerful others, or as unpredictable because of the great complexity of the forces surrounding him [p. 1].

In defining internal control, Rotter stated:

> If the person perceives that the event is contingent upon his own behavior or his own relatively permanent characteristics, we have termed this a belief in internal control [p. 1].

Lefcourt (1966) provided a more succinct definition of internal-external locus of control:

> Internal control refers to the perception of positive and/or negative events as being the consequence of one's own actions and thereby under personal control; external control refers to the perception of positive and/or negative events as being unrelated to one's own behavior in certain situations and therefore beyond personal control [p. 206].

This latter definition added positive and negative characteristics to the concept of locus of control, both internally and externally.

In addition to research in the field of self-responsibility which resulted in studies of locus of control, there have been many studies conducted in the area of self concept. Self has had many interpretations but the definition that has come to be associated with the term self-concept defines self as "the individual who is known to himself" (English & English, 1958; Wylie, 1961). Rogers (1951) defined self-concept as an image of oneself which developed out of an individual's interactions with the environment. A more elaborate explanation of self-concept called it an abstraction an individual develops about the attributes, capacities, objects, and activities he possesses and pursues (Coopersmith, 1967). Of the many studies concerning self-concept, Beebe (1970) conducted an investigation into the relationship between self-concept and internal-external control in adolescents and found positive correlation between internality and self-concept for all 4th, 6th, 8th and 10th grade students tested. Locus of control, therefore, is not only an important factor in the belief in children of causal relationship but has a definite relationship to self-concept, making it a prime variable for research in the area of behavioral goals in education.

Several questions concerning internal-external control have been investigated. One aspect has been to define its determinants. Race, sex, and socio-economic status (SES) have predominated among the factors studied, and scales for measuring locus of control, needed for such studies, have been developed over the last sixteen years. Phares and James (1957) were instrumental in developing the first IE scales. Bialer (1961) produced a locus of control questionnaire for use with children which was

built upon the adult scale of Phares and James. Graves and Jessor (Graves, 1961) adapted an IE scale for high school students. An Intellectual Achievement Responsibility Scale (Crandall, Katkovsky and Crandall, 1965) was developed to measure both positive and negative results. The Nowicki-Strickland Locus of Control Scale (1970) has been formulated primarily as a more easily administered questionnaire, limited to 40 questions with a forced yes or no answer to each, and with a high construct validity. Significant correlations with the Intellectual Achievement Responsibility Scale, with the Bialer scale and with the Rotter and the Nowicki-Strickland adult scales were reported (Nowicki, 1973). Complete details on the Nowicki-Strickland Locus of Control Scale are provided in Chapter III and in Appendix C.

With the availability of such techniques for measuring IE, various studies of the determinants of locus of control have been possible. Battle and Rotter (1963) have shown that locus of control varies with race and socio-economic status. Strickland and Nowicki (1971) tentatively reported that Negro children generally appear to have more external scores than do white children. Ludwigsen and Rollins (1971) found that sixth graders of higher SES showed more internality than those of lower SES. These studies reinforced the earlier findings of the Locus of Control Scale (Bialer & Cromwell, 1961), and the Children's Picture Test of Internal-External Control (Battle & Rotter, 1963), already referred to, where internal responsibility beliefs showed statistically significant correlation with SES, with a higher correlation for whites than for Negro children.

In a study of high school juniors and seniors, however, Ducette and Wolk (1972) reported no differences between the black disadvantage sample and the white disadvantaged sample on such variables as levels of aspiration and risk-taking increase. A tri-ethnic study of personal control as related to social class and ethnic group (Graves, 1961) reported that, in the tri-ethnic community studied, whites were found to be the most internal, followed by Spanish Americans, with Indians being the most external. Yet, in a study on intellectual achievement responsibility in Negro and white children, (Solomon, Houlihan & Parelius, 1969), race showed no significant effects, and it was suggested that social class may confound results in studies using more general measures of children's locus of control which do report differences between racial groups. It may be concluded from the studies, therefore, that further research is necessary to produce more definitive information on the factors of race and SES.

In researching sex as a determinant of IE, the Intellectual Achievement Responsibility Scale, (IAR) (Crandall, Katkovsky & Crandall, 1965) showed girls' internality somewhat higher than boys' from grade six upwards and a significant increase for girls' internality for negative events from grade three to grade five as well. Strickland (1971), reporting the results of studies by Nowicki and Roundtree (1971), and Nowicki and Barnes (1973), stated that both studies found a significant correlation between internality and achievement scores for males and that, in the latter study, internal scores were related in Negro adolescent males to total votes received for an elective position.

Roberts (1971), administering the Nowicki-Strickland scale, found significant correlations between internal locus of control and reading achievement for both sexes and a significant relationship with mathematics achievement for males but not for females. In a report on the effects of an experimental program to improve self concept, attitudes toward school, and achievement in Negro elementary school children, Smith (1970) found that girls showed a more positive change in self concept than did boys. Stephens (1971), reporting the results of several studies of cognitive and cultural determinants of early IE development, stated that no straightforward relationship of IE to persistence on an intellectual task was found, but that it tended to be positively related for girls but negatively for boys.

Again, the IAR scale also found that the assignment of self-responsibility for achievement events was frequently predictive of the boys' achievement behaviors but essentially unrelated to those of the girls (Crandall, 1965). Chance (1965) found that maternal permissiveness, early independence training and mothers' flexibility of expectations for their children were significantly related to their sons' belief in internal control, but that no significant relationships were found between these maternal variables and daughters' belief in control. In a review of locus of control studies relating to relationship with academic achievement, Nowicki (1973) concluded that males' academic achievement performance showed more consistency in predictability from locus of control scores than did females.

Thus, it may be judged that sex is a determinant of internality in males in certain learning situations, particularly in the area of

intellectual achievement, but that further research is necessary to determine more precisely the exact relationship of sex to learning situations for males as differentiated from that relationship to learning situations for females.

Locus of control studies related primarily to the field of academic achievement have produced reports on many aspects of importance both to the planning of curricula and methodology. One of the findings of Phares (1957) was that learning under skill conditions is different from learning under chance conditions. In this study a skill condition was defined as:

> a situation characterized by the fact that the occurrence of a reinforcement is related by the subject to his performance, while a chance situation is one wherein S [subject] perceives the task as so difficult that being right or wrong is not so much a function of skill as it is luck or E's [experimentor's] whim. The occurrence of reinforcement, then, is beyond S's control [p. 339].

Studies by James and Rotter (1958) and by Rotter, Leverant and Crowne (1961) confirmed this finding.

Positive correlations of IE with intelligence test scores were found in studying the relationship of IE to intelligence (Bialer & Cromwell, 1961). The IAR scale reinforced these findings, although the correlations were low. Using Coopersmith's Self-Esteem Inventory and the Iowa Test of Basic Skills, Trowbridge (1971) reported on a study of the relationship among self concept, school performance and divergent thinking. This study found that within a socio-economic status division there was a positive relationship between self concept and school performance. Using Waetjen's Self Concept as a Learner Scale, Landis (1972) found high positive correlations between self concept and mathematics

and reading achievement. Shaw and Uhl (1969) found that IE was intimately involved in achievement and that, in turn, with SES. To go further back in research, Fink (1962), studying the relationship of self concept to academic achievement in boys, reported that boys with adequate self concept had higher academic achievement than those with inadequate self concept. Research into children's beliefs of IE control of reinforcements and academic performance in two studies (McGhee & Crandall, 1968) found that children who were more highly internal on either IAR subscore or on the total test score consistently attained higher academic performance scores in both studies.

In the report on the effects of an experimental program to improve self concept, attitudes towards school and achievement of Negro elementary school children, referred to earlier, Smith (1970) found that those on the experimental program showed more positive self concept regarding academic competence.

Computer-assisted instruction (CAI) and its effects on the self concept, locus of control of students and their level of aspiration has been investigated in the field of mathematics (Smith & Hess, 1972) with the conclusion that the computer-assisted instruction did not prove dehumanizing. It was also reported in this study that the computer-assisted instruction resulted in no general negative attitudes. Individually prescribed instruction (IPI) and its relationship to self concept for third, fifth and sixth graders has been studied by Myers (1972) who reported that students in IPI programs for three years had significantly lower self concepts than students who had been in IPI programs for one or two years. Using the Nowicki-Strickland Locus of Control scale,

Nowicki and Walker (1973) found that the Metropolitan Achievement Test scores were significantly related to locus of control in fifth and sixth grade students of both black and white races. In a study of the relationship of locus of control and achievement in reading, language, mathematics and work study skills in seventh and eighth grade male students, Martin (1972) reported a significant correlation between locus of control and grade placement.

The report on equality of educational opportunity (Coleman, Campbell, Hobson, McPartland, Mood, Weinfeld & York, 1966) stated that school achievement was better predicted by this variable (IE) than by any other variable studied. Nowicki and Strickland (1971) confirmed this conclusion in reporting on the use of the Nowicki-Strickland Locus of Control Scale. They found that locus of control was a significant correlate of a number of competence-related behaviors in children.

In summary, the literature indicates that there are many factors involved as determinants of locus of control. Race, sex and socio-economic status are the dominant factors in studies already conducted. However, in the literature there is a noticeable scarcity of research on factors such as language barriers, environmental or geographical factors which might also prove to be determinants of locus of control.

In pursuing the goal of developing students to their full potential, educators have been re-assessing the traditional subject matter content of the curricula and have been focusing attention on behavioral objectives. The significant correlation between locus of control and competence-related behavior is a factor to consider in attaining these objectives.

Additionally, the re-evaluation of methodology by professionals has resulted in various adaptations in our public school systems of the "open classroom" concept which originated in the British Infant schools. This open classroom environment, or concept, and the locus of control concept offer completely different approaches to education than the traditional public school instruction of American education. However, the relationship between these two ideas remains to be studied. Just what effect the open classroom environment has on locus of control, a proven correlate of competence-related behavior and a proven predictor of academic achievement, is still to be determined.

Open Classroom Concept of Education

> Each stage in the child's development is accompanied by all sorts of new learning based on experience, and what helps the child progress from stage to stage is his own activity Silberman, [p. 216].

The theory of the Swiss psychologist Piaget is, in essence, one of the prime concepts underlying the open idea of education (Furth, 1970). Reflecting the Aristotelian principle of "constant change," affected in its development by such philosophers as Rousseau and by the work of Montessori and Dewey towards a libertarian-oriented type of learning, polarized by Piaget's work, and an outgrowth of World War II (Barth, 1972), this concept of education has been working a marked change in the British Infant and Primary Schools (Plowden Report, 1967). Children and Their Primary Schools, the so-called Plowden Report, contains a complete report on the development and practices of open education in England, but the concern of this study is with American education, and it is to this facet of the open concept that this review of the literature was directed.

Today, American educators in increasing numbers are looking at this significant alternative to our traditional concept of schooling (Nation's Schools, 1971). Rogers (1972) ascribed four positive reasons for this present interest: the failure of curriculum reform of the past ten years; critical concern of more Americans with our way of life; the importance of the individual in our society, and the happy atmosphere (evident to American observers) in the British schools using this concept of open education.

Just what is the open concept of education? There does not exist a completely satisfactory scientific definition accepted uniformly by educators any more than there exists just one name for it. Called "open education" (Barth, 1972; Nyquist, 1972), "informal education" (Silberman, 1970), "open school" (Boulding, 1972), "open classroom" (Kohl, 1970), it was defined by Nyquist as an approach to teaching which discards the familiar classroom organization and the traditional stylized roles of teacher and pupils for a much freer, more informal, highly individualized, child-centered learning experience. Silberman called it an attitude and a conviction. In Crisis in the Classroom (1970) he explained that he considered the term "informal education" more inclusive and said:

> Informal education is less an approach or method than a set of shared attitudes and convictions about the nature of childhood learning and schooling. There is a conviction that learning is likely to be more effective if it grows out of what interests the learner, rather than what interests the teacher [p. 208-209].

Kohl (1970) agreed that it is hard to say what an open classroom is, rather one needs to feel it. David Hawkins (Silberman, 1970) felt that the teaching-learning process of the informal classroom is a triangular relationship of child, teacher and "stuff" (the name adopted

from the British Infant Schools which refers to the multi-assortment of teaching materials in their schools). Roland Barth (1972) quoted an unidentified proponent of open education: "If I have to explain it to you, you'll never understand."

Yet, underlying all of these varying definitions is the element of freedom for the learner as well as the acknowledgment of his importance. In John Dewey's words quoted in Chapter I:

> Let the child's nature fulfill its own destiny, revealed to you in whatever of science and art and industry the world now holds as its own.

The open concept (hereafter referred to as the open classroom) is based on the theory promulgated by Piaget that children learn in different ways at different times from things around them which interest them and from each other, and the children learn best when sparked by their own interests (Furth, 1970). In an open classroom the teacher becomes more of a guide and resource person than a lecturer. The children are encouraged to learn through their own interests. Emphasis is on learning rather than teaching, and activities are geared to the capacities and emotional needs of each child in an attempt to develop the whole individual through a series of happy and busy experiences of learning (Nation's Schools, 1971).

Although the implementation of the open classroom is as varied as its nomenclature, there are certain common characteristics. The stress is on developing initiative, creativity and critical thinking in children (Nation's Schools, 1971). Its goals are happy children who feel successful and confident, self-disciplined, capable of independent thinking and desirous of continuing the learning process, who enjoy

reading and who have acquired the necessary skills in mathematics, science, social studies and English because such skills were necessary to the solution of problems with which they were involved (Nyquist, 1971). This type of education attempts also to be person-centered, idea-centered, experience-centered, problem-oriented and interdisciplinary, with the community and its other institutions (in addition to schools) a part of the process (Nyquist, 1971).

Since children are allowed freedom of speech and movement, the noise level of such rooms is high. There is a lack of ordered rows of desks and chairs. These have usually been replaced with small groupings of desks or tables and chairs, arranged informally. The rooms have a large amount of all sorts of materials (the "stuff" of the British teachers' rooms). The room or area itself is not the limit of any one of these classrooms. Often the adjacent corridors or carrels are overflowing with activity. These activities are numerous, with children working singly or in small groups according to their interests. The teacher is sometimes mingling with small groups and checking on their activities, working with a single child or playing a game with a few of the children. All activities are concerned with learning and are guided for this purpose by the teacher (Silberman, 1970). According to the experts on open classrooms, the success or the failure of an open school approach rests not on the materials, but on the teacher (Richman, 1972). Therefore, it follows that there will be as many diverse kinds of open classrooms as there are teachers of such rooms, but in all the happy busy atmosphere is most noticeable (Rogers, 1972).

The variance in the characteristics of these diverse "communities of learning," as Bruner calls them (Dennison, 1969), will include, for example, free time within the framework of a traditional classroom as well as more radical departures from the traditional setting. The free time is the incipient stage of open classroom found very frequently throughout the United States as teachers gradually move into this type of schooling.

One of the classic types, modelled on the British Infant School plan, or, more specifically, the Leicestershire plan (Blackie, 1971), involves a single teacher working with small groups or single children as they investigate through projects built upon their own interests the world around them, acquiring skills as needed, learning to work independently in an informal situation.

Another type of open classroom education is the team approach. Here a group of teachers will combine classes and work within the framework of these classes with each teacher usually being a resource person in a special area. There are also some areas where a senior teacher utilizes a group of training teachers to provide open classroom activities (Herlig, 1972).

The physical areas involved may be a self-contained classroom, a large school area, several rooms with movable walls, corridors, the natural environment, the community and/or combinations of all of these (Herlig, 1972; New England Program in Teacher Education, 1972).

Open Classroom Models or Programs

One of the first of the open classrooms was established by Lilian Weber in the corridors of P. S. 84 in Harlem, New York City, which is

reported to have made striking changes in the behavior of the disadvantaged students with whom it was concerned (Tobier, 1969). In Philadelphia, Pennsylvania, Mrs. Lore Rasumssen (Silberman, 1970) reported positive behavioral changes in the open classroom she set up for Negro children.

Teaching the children of Mexican parentage to speak English more quickly has been the reported result of the Tucson Early Education Model inaugurated by Dr. Marie Hughes. This model departed from the small slow beginning approach used by Weber and Rasmussen. Instead, multi-classrooms were opened almost simultaneously, and large murals on the walls depicting everyday experiences of these children were employed to teach English (Silberman, 1970).

Other programs such as Headstart and Follow Through, along with Project SOLVE, federally funded, are presently using this concept of the open classroom in their approach to the educational problems. The Educational Development Center in Newton, Massachusetts, has taken over the Follow Through program for further development, and an analysis of this open classroom education has been made by the Educational Testing Service (ETS) in Princeton, New Jersey. However, no statistical analysis is included since ETS felt that such analysis required further operational time (Educational Testing Service, 1970). North Dakota's School of Behavioral Sciences has inaugurated open classrooms throughout the state in a large project designed to retrain teachers of traditional rooms and to train new teachers in this alternative type of schooling (Perrone, 1971).

The specific examples cited are at the primary and/or elementary level of education. While such are in the majority in this country,

there are also schools with older students which have implemented or are in the process of implementing this type of education. In the New England area, for example, The Highland Park Free School in Roxbury, Massachusetts, a fully accredited school controlled by the parents of the low-income black community, encompasses kindergarten through grade eight and is modelled on the Leicestershire plan (New England Program in Teacher Education, 1972). In Warwick, Rhode Island, two open classroom pilot programs on the seventh grade level using a team approach are in operation at Winman Junior High School (Grades 7-9). This new building has been constructed for operational capability on an open classroom basis. Team teaching is strongly supported by the administration in this system and is broadening the implementation of the open classroom concept (C. Johnson, personal communication, October 23, 1973).

Research in the area of open classroom education is extremely scarce. Rogers (1972) noted that there is almost a plea for research among those interested in the idea of open classrooms but who want concrete evidence of its value. Barth (1972) stated that the important theoretical assumptions underlying the open classroom need to be exposed and analyzed.

Of the available research, Gardner's long-term study in England (1966) showed definite superiority in the experimental (open classroom) school children in such areas as:

listening and remembering
neatness
skill and care
free drawing and painting
ingenuity
English (including original composition)
interests

This study also reported the same group of children ahead in:

social situation
concentration on an uninteresting task
moral judgment
general information
reading
handwriting

The traditional school children (control group) were reported superior in:

mechanical arithmetic
arithmetical problem-solving

Although Gardner's study reported favorably on the experimental or open classroom type of education, her methods and statistical analysis are now being scrutinized with caution (Barth, 1972). This study, however, has been the only contemporary attempt to compare traditional schooling with open classroom education over a long period of time (1952-1963) (Barth, 1972).

A review of statistical research findings comparing traditional and open classroom types of education per se in the United States has revealed a paucity of such research in the available literature (Rogers, 1972). Among the studies that have been conducted has been the development by Newman (1972) of a list of seventeen manifests concerning the environmental aspects contributing to the success of an open classroom. Among the seventeen are an encouragement of risk-taking as a natural process of learner's growth; an environment where the teacher and learner are encouraged to share in learning modes; a milieu where the students and teachers are partners—to cite a few. Upon perusal the list appears to be somewhat repetitive and to be based on the historical development of the theories contributing to this type of education.

A national seminar of architects, teachers and administrators, all of whom had experience with open classrooms, has reported its conclusion that flexible physical arrangements combined with flexible teaching programs hold great promise for training people to think for themselves, one of the goals of the open classroom concept (IDEA, 1971). This seminar concerned itself primarily with the physical aspect of a school building for open classroom education—design, furniture, movable walls, etc.

To date, Roger's criticism concerning the lack of research appears to remain valid. No statistical analysis of the efficacy of the open classroom type of education versus the traditional type of schooling has been found in the literature available.

Summary

What is indicated in the literature is that society is demanding more of education than just the intellectual development of the child (Neill, 1960); that classroom learning needs improvement (Parker, 1963); that education has a duty to help create a better or happier or more courageous or more sensitive or more honest man (Bruner, 1962), and that educators in the United States are investigating, formulating and implementing the open classroom as an answer to these indications. The lack of research in the literature concerning the efficacy of the open classroom education leaves it, however, open to serious challenge. If the open classroom is to be truly a person-centered and experience-oriented type of successful learning, then research along these lines is necessary to produce concrete evidence that these goals are attainable.

In addition, since person-centering is a behavioral goal, then the relationship of locus of control, one aspect of behavior already related to the learning situation by the research, to the open classroom environment must be studied to provide one basis upon which professional educators may rely in implementing such a radical departure from the traditional public school format. Although the determinants of locus of control, or the broader concept of self-concept, have not been clearly and completely identified, the literature contains a variety of studies on the relationship of locus of control to learning, and it may be assumed from these studies that locus of control is a significant factor in the learning situation, that it correlates positively with many competence-related behaviors and that it is a predictor of academic achievement.

CHAPTER III

RESEARCH DESIGN AND PROCEDURES

In conducting this study, the design and procedures used followed an accepted educational research design. A specific environment was thought to relate to the improvement of the psychological development of students and to the improvement of the learning process; literature related to this subject was reviewed; a set of hypotheses was stated; a program was designed and implemented; appropriate measurements were taken, and the collected data were analyzed and summarized for significant findings and implications.

Selecting the Problem

The concept of the open classroom has interested many American educators because of its potential applicability to the public educational system. The literature, however, demonstrated that there is a scarcity of empirical research in the area of the open classroom for specific learning goals. Since one basic objective of education is the development of the full potential of an individual, and since one important facet of such potential is the concept of self-responsibility for learning, then factors which have been found to be integral to the concept of self-responsibility for learning can be assumed to be important in their relationship to the open classroom.

The literature concerning studies of self-responsibility presents evidence that one of the important factors in the theory of self-responsibility for learning is the feeling or concept of the individual concerning the locus of those factors which affect or determine his

behavior or learning. One aspect of assessing the value of the open classroom as it relates to specific learning goals, therefore, is to assess the significance of the relationship between the open classroom environment and locus of control. The intent of this study was to investigate the effect of the open classroom environment on locus of control.

Since studies concerning locus of control have shown a significant correlation between various types of academic achievement and locus of control, between socio-economic status and locus of control and between sex and locus of control, this research attempted to determine these correlations for two reasons: to build upon previous research by further validating these correlations and to use such relationships as factors in the present research.

In developing the design for this research, the investigator addressed the following major question:

1. Does the open classroom environment significantly improve internal locus of control?

In addition, the following secondary questions were asked:

1. Is there a higher degree of internal locus of control in high achievers in the open classroom environment than in high achievers in the traditional classroom environment?
2. Is there a higher degree of internal locus of control in low achievers in the open classroom than in low achievers in the traditional classroom?

3. Is there a higher degree of internal locus of control in low achievers in the open classroom than in high achievers in the traditional classroom?

The secondary questions relating to achievement were selected for study as a result of previous research which had demonstrated significant relationships between measures of achievement and locus of control as measured by the Nowicki-Strickland Locus of Control Scale (See Appendix C).

Research Design

In order to test the hypothesis and answer these questions, an experimental program was established and a four-group design was employed for analysis. This design is an expanded version of Campbell and Stanley's nonequivalent control group design (1963). Because randomization of subjects to the four groups was impossible, covariance was used as a statistical control, using a pre-test locus of control measure as a covariate. Table 1 illustrates the modification made in the original design.

The design was meant to establish controls for environment (open or traditional) and for achievement (high or low). Also, the control groups, in this design X_3 and X_4, were meant to indicate that the treatment groups were not being compared with no treatment but rather with a different treatment. An adequate description of both treatments was developed so that the effect of the treatment by these two environments on locus of control could be effectively analyzed.

Table 1

The Research Design

O_1	X_1	O_2
O_3	X_2	O_4
O_5	X_3	O_6
O_7	X_4	O_8

O_1, O_3, O_5, O_7 = pretest measures of locus of control

O_2, O_4, O_6, O_8 = posttest measures of locus of control

X_1 = high academic achievers in open classroom environment

X_2 = low academic achievers in open classroom environment

X_3 = high academic achievers in traditional classroom environment

X_4 = low academic achievers in traditional classroom environment

Population and the Sample

The population of Winman Junior High School in Warwick, Rhode Island, from which the sample was taken, is made up of Caucasian children in the seventh, eighth and ninth grades, ranging in socio-economic status from lower to higher middle-class families. There is no ghetto section in the city in which the school is located, nor does the city have any designated slum area. The enrollment of the school from which the sample was taken is approximately 1,100 pupils, of which only three are Negro children, all from the same family. The school has only a mild drug situation and little juvenile delinquency (Warwick Police Department, personal communication, 1974).

It is assumed that this school represents in its student body that segment of the American junior high school public education system inhabited by a middle-class population with a minimum of present-day social problems. Therefore, the number of social problems influencing the variables in the study is assumed to be less than in a junior high school with a more general representation of socio-economic classes.

The seventh grade population from which the sample was taken was comprised of 386 seventh grade students. This population had been placed in four large segments previous to the start of the school year by a combination of two factors: academic achievement grouping based on sixth grade ITBS test results in vocabulary, reading, language and mathematics, and by the recommendations of the sixth grade teachers who had taught these students in the elementary schools from which they had been assigned. The first two segments of the seventh grade consisted of the children with higher academic achievement scores in the ITBS sixth grade testing who were also recommended by their sixth grade teachers for the more academically-oriented groups in the seventh grade. The students in these two segments were assigned, previous to their entrance into seventh grade, either to the open classroom environment or to the traditional classroom environment. This assignment was made by the guidance counselors of the junior high school on the basis of the two factors described. The two segments totalled 200 students, 100 in each environment, and comprised the sample in the study. A median-split technique was then used to divide each group of 100 into high and low achievers as measured by the ITBS scores obtained during the previous school year.

Socio-Economic Status of the Sample

In order to determine the socio-economic status (SES) of the sample, and in order to replicate procedures in previous studies for making this determination, the Hollingshead Two-Factor Index of Social Position was used (Hollingshead, 1965) (See Appendix B). This index was the SES instrument used in the development of the IAR scale and the Nowicki-Strickland Locus of Control Scale. It is a modification of the Alba Edwards' system of classifying occupations into socio-economic groups. Edwards' system is used by the United States Bureau of Census for classification purposes.

Hollingshead has used occupation and education plus a factor weight to develop five classes of socio-economic status (SES). He has based the selection of occupation as a factor on the assumption that occupation reflects the skill and power individuals possess in society. He has presumed that education, the other factor he used, is a reflection of both knowledge and cultural tastes of individuals.

In this investigation, the Hollingshead index was used for two reasons: it was assumed that children in the seventh grade reflected the socio-economic status of their families and, since the Nowicki-Strickland Locus of Control Scale employed the Hollingshead index, its use in this research would provide an equivalent basis for SES classification to that used for the locus of control instrument of the study.

The students in the sample were asked to bring to school a paper on which were listed the occupation of the head of the family and the amount of education received by that individual. An explanatory letter

accompanying this request defined the head of the family as that individual in the family who provided the main financial support for the family, lived in the household and played a major role in deciding family matters. The classifications for amount of education used by Hollingshead were also given in the accompanying letter. The information received was scored by the Hollingshead system, and the SES of the sample was determined (See Appendix B). It was found that no statistically significant difference in SES existed between the groups in the two environments. Table 2 shows the SES classes in both high and low academic achievers in the open classroom and in the traditional classroom environments.

Table 2

Distribution of Socio-Economic Status of Sample

Group	Class				Total
	I	II	III	IV	
Open (N = 100)	14	21	43	22	100
Traditional (N = 100)	15	25	36	24	100
Total Sample (N = 200)	29	46	79	46	200

Range of the Sample in Intelligence Testing

The Otis-Lennon Intelligence Test was administered to the seventh grade population at the start of the school year. In the sample the test scores showed a range from a mean of 107.5 to 119.7 with no statistically significant differences between the two environment groups(See Appendix F).

Distribution of Sex in the Sample

The two environments showed a nearly equal distribution of males and females. Table 3 illustrates the number of males and females in high and low achieving groups in both environments. A chi-square test produced no statistically significant difference between the groups in both environments(See Appendix F).

Table 3

Distribution of Males and Females
in Open and Traditional Environments by Groups

Group	Male	Female	Total
X_1 (N = 50)	21	29	50
X_2 (N = 50)	27	23	50
Total Open Environment (N = 100)	48	52	100
X_3 (N = 50)	25	25	50
X_4 (N = 50)	26	24	50
Total Traditional Environment (N = 100)	51	49	100

Instrumentation

Form 6, Level 13, of the Iowa Test of Basic Skills (ITBS) was used in this research as the instrument to measure academic achievement in language and mathematics. The Iowa test was selected to replicate the instrumentation of previous studies and was used to obtain the

four achievement groupings of the design. Since this test is extensively used in the United States and is widely accepted in the educational field, a discussion concerning it has not been included in the study.

As a measure of locus of control, the Nowicki-Strickland Locus of Control Scale was selected as the instrument in this investigation (See Appendix C). Of the various tests available to measure locus of control in children, the measure constructed by Bialer (1961), consisting of 23 items to be answered yes or no, was found inadequate in format and reliability (Schaffer, Strickland and Uhl, 1969). The Children's Picture Test of Internal-External Control (Battle and Rotter, 1963) is difficult to administer to large groups, and available reliability information is incomplete (Nowicki, 1971). The Intellectual Achievement Responsibility Questionnaire (Crandall, Katkovsky and Crandall, 1965) is aimed specifically at assessing children's beliefs in reinforcement in intellectual-academic achievement situations. In addition, its forced-choice format involved reading two choices for each answer and selecting one of the two. This was considered to be difficult for seventh grade children.

The Nowicki-Strickland scale is a pencil and paper measure of forty questions requiring either yes or no as the forced-choice answer for each question, with higher scores related to external orientation. Because the questions can be asked orally, it is easily administered. Reliability estimates have been reported satisfactory at all grade levels with test-retest reliabilities from .67 to .81, and internal consistency reliability ranging from .63 to .81 (Nowicki, 1971). Since the Nowicki-Strickland scale has been used in previous studies

of seventh grade students, in research on environmental effects and in its relationship to academic achievement, it was concluded that it was an appropriate instrument for measuring locus of control and its relationship to the open classroom environment in this investigation.

A pretest of the Nowicki-Strickland scale was administered at the start of the school year. The students were given pencil and paper, asked to write either yes or no to the questions the investigator asked them. They were told that this set of questions was part of a survey of the educational system to help determine certain educational methods and would have no effect on the school records of any of the students.

At the close of the school year a posttest of the Nowicki-Strickland scale was administered in the same manner. At this time the students were told that this was the second half of the survey in which they had participated during the early part of the school year.

Every effort was made to insure optimal conditions for the two administrations of this scale. The testing was done on all subjects during the first period of the school day; interruptions were not allowed; noise was kept to a minimum. Every question was repeated twice in a slow, clear voice, and the classroom teachers proctored to insure that all subjects heard each question and answered each question. The conditions of the pretest were duplicated for the posttest.

Implementation of Instruction in the Two Environments

For an entire school year, both groups received instruction in their respective learning environments. A full description of both environments follows:

The Open Classroom

One-half of the sample (100 students) was assigned to a cluster of three classrooms, often referred to in open classroom literature as a "pod." These rooms had movable partitions which were usually kept open as one large area. In addition, there was one connecting room with immovable walls. Both this room and the pod opened into a carrel area between the regular school corridor and the pod. This carrel area had ten individual stations consisting of a section of work shelf, a light and a wall bookshelf. There were five of these stations along each of the two opposite walls of the carrel. All areas were carpeted and equipped with acoustical tile in the ceilings. The furniture, consisting of oblong and round tables and of vari-colored chairs, was movable. Wheeled bookcarts and cabinets, including a portable science working laboratory unit, carried supplies and books wherever they were needed.

Personnel of Open Classroom

A discussion of the personnel of both environments will be found later in this chapter. However, the teaching assignment in the open classroom was composed of four experienced teachers, one each in science, social studies, mathematics and English. Four student teachers were also assigned to this area during part of the school year. The open classroom students were the only assignment of the four experienced teachers for the complete school year.

Schedule of the Open Classroom

Students remained in the open classroom environment for four of the six school periods each day. The other two periods of each day, assigned for part-time subjects (music, guidance, industrial arts)

or for French and gym, were scheduled in the same manner for students in the open classroom as for students in the traditional classroom—that is, students reported to the specific area of the school where such subjects were scheduled on the specified days for such instruction. These two periods of the school day were considered unrelated to the investigation.

Instruction in the Open Classroom

Learning Activity Packages (LAPS) formed the basis for covering the regular school curricula. These LAPS were prepared by the open classroom teachers. A LAP consisted of a group of dittoed sheets listing a set of learning objectives involved in the LAP, an explanation of the learning principles the LAP contained, a choice of several learning processes to be done by the student to attain mastery of the stated objectives, and a choice of instruments by which the student could demonstrate the mastery (See Appendix D). Inter-relationship of the four academic disciplines was implemented in the LAPS. For example, when a student was learning about India in social studies, the folklore of India and surrounding countries was offered in a LAP in English. The study of numerical prefixes in the language area received reinforcement at the same time in the mathematics LAP.

Many field trips were included in the work in the open classroom. On trips involving busing, the entire group participated as a unit. Some of the trips were to salt marshes where students obtained specimens for study in the classroom, to science museums, art museums, places of historical interest such as a replica of a medieval castle and a tour of their own city to reconstruct its Colonial development. Small groups

went regularly into the woods and fields surrounding the school to gather specimens of scientific interest and for creative writing purposes.

Community resources were heavily used. Sari-wrapping lessons were given by a mother from India; "rock-hounds" brought in displays and helped students with identification of rocks they had gathered from beaches, fields and woods of the state; a poet read some of his works during a visit to the classroom. Students became pen pals for elderly and ill people in the community; some students prepared a travelling bulletin board for convalescent homes in the community and visited several of these homes to develop community responsibility; many students made scientific toys to demonstrate scientific principles; other students decorated the entire school with Christmas wreaths concocted from discarded IBM cards; another group of students constructed in the single adjoining room a Japanese poetry room in which they learned to read Tanka poetry in the original and in the translation and to write poetry in the Tanka form. The students produced an audio-visual history of the school year with original slides and tapes as well as a literary yearbook which included mathematical cross-word puzzles, anacrostics, form poems, science-fiction stories and parodies of folk tales.

The teachers gave varying times of class instruction, depending upon the needs of the students. Students often formed themselves into small groups, but the membership in the groups was constantly changing. At certain times, the entire student body was divided into four segments of fairly equal size for traditional type of instruction. This was used primarily when new elements of a subject matter discipline were introduced. LAPS were then made available for the assimilation of the mater-

ial, and each student proceeded to complete LAPS as his own responsibility. No demand was made by the teachers that a student work on any particular subject at any specified time, other than the traditional instructional times outlined above. The use of the time spent in the open classroom was under the student's control, and the use each student made of this time was the result of his own decision. Teachers were available to guide, correct, reteach or drill as the students needed such help.

It was not always necessary for a student to complete or to work on every LAP. If a student wished to substitute other types of learning activity for LAP work, he was allowed to do so, providing the substitution included the same learning principles as the replaced LAP. This limitation was necessary because the open classroom students were responsible for the same curricula as the traditional classroom students.

Marking System of the Open Classroom

Although tests and quizzes were used in the open classroom environment, they were not usually administered to the entire group at one time. Small groups had tests when enough students felt adequately prepared to form such a group. Marks in the subject areas had to be given to the students to fit into the overall school system of the city. The primary emphasis for marks was, however, on the quality of the work performed and on the effort and interest exhibited by the student. A conference between the student and the teacher concerning the student's progress was held during each of the four marking periods, and a common agreement on a fair grade was made at that time. In mathematics a slightly different method was used. Small groups of students

met, and each student averaged his own work and accumulated scores. This result was then checked against the teacher's record, and the mark for that period in mathematics was established.

Summary of the Open Classroom Environment

Throughout the school year the emphasis in the open classroom environment was on the student's responsibility for his own learning. This was stimulated and encouraged by the climate of the classroom, by the teachers' attitudes, by the material available and by the students' own interests being made a basic part of the learning situation.

The Traditional Classroom

The traditional classrooms were self-contained rooms, carpeted and with acoustical tile in the ceilings. They also had movable furniture identical to that in the open classroom, but each room was limited in the physical arrangement of the furniture by the small size of the room. Each of these rooms was the equivalent in floor space to one-third of the open classroom "pod." Some of the walls in these rooms were movable, but they were opened only occasionally for such purposes as showing films or for a dramatic performance by one of the classes. The classes for English instruction were on one floor of the school, and those for mathematics were on another floor. Carrels were outside all of these rooms and duplicated those outside the open classroom. The primary physical difference between the two environments was the self-contained classroom of the traditional environment and the large open area of the open classroom environment.

Personnel of the Traditional Classrooms

The traditional group of the sample was divided into thirds with three teachers in each subject area being assigned to classes of 33, 33 and 34 students respectively. There was also a student teacher assigned to the traditional segment of the sample during one semester of the school year. The teachers in this environment were also responsible for four other classes per day in their respective subject areas.

Schedule of Traditional Classrooms

In the traditional classrooms the students reported to their various academic classes for one period a day per class. In the area of part-time subjects (music, guidance, industrial arts) or French, and gym, the same type of schedule existed for the traditional classroom environment as has been described for the open classroom environment.

Type of Instruction for Traditional Classroom

The traditional approach to curriculum requirements was the normal routine of each school day for the students in the traditional environment. This approach centered around daily lessons and daily requirements, with a few long-range assignments such as book reports or library research requirements. When the entire group of 100 students met as a unit, it was in the same subject matter field, such as English or science, but few of the large group meetings were held during the school year. The last ten to fifteen minutes of each period were used for the purpose of starting assigned homework which usually was to be completed for the class on the following school day. All students

in a class received the same assignment, and all had the same time limit within which to complete the work. The time of the classes was regulated by the schedule of the school, and, within a rotating weekly schedule of classes, the instructional time for each academic subject was 250 minutes per week.

Marking System in the Traditional Classroom

The teachers of the classes in the traditional environment followed the school procedure for marking during the four marking periods of the school year. Tests and quizzes were administered with frequency throughout the school year and formed the basis for the mark the student received in each academic subject during each of the four marking periods. The rigidity of the class schedule precluded for both students and teachers the possibility of a conference with each student concerning his mark.

Summary of the Traditional Classroom Environment

The students in the traditional classroom environment were exposed to a teacher-centered, subject matter-oriented atmosphere during the entire school year. The content of subject matter and the method of instruction were determined by the teacher. There was a rigidity of scheduling to which the students had to conform; there was a fixity of homework assignment which was decided for them; there was a change of room with each change in academic subject matter instruction, and a complete change of teachers accompanied this change. There was no formal interdisciplinary subject matter instruction in the academic areas. This was the traditional classroom environment in the sample investigated.

Teaching Personnel in the Two Environments

There were ten teachers involved in this research—four in the open classroom and six in the traditional classroom, none of whom were aware of this study. All were experienced teachers with a minimum of two years' previous experience and a maximum of twenty-one years' experience. The ages of the teachers ranged from twenty-five years to fifty-six years. Of the four teachers in the open classroom, two were men and two were women. Of the six in the traditional classroom, two were women, and four were men. All were graduates of liberal arts colleges, and all were involved in graduate courses during the period of the investigation. A minimum of 18 hours graduate work and a maximum of 66 hours graduate work were represented by these teachers. The four teachers in the open classroom had requested the open classroom assignment. The six teachers in the traditional classroom had indicated their preference for a traditional environment previous to their assignment for the year. Ratings of these ten teachers by department heads and principals for the previous two years indicated that these teachers had demonstrated a definite personal commitment to the field of education. Therefore, as far as could be determined, the teaching personnel was not a serious variable in terms of affecting the results of the study.

Student Teachers in the Two Environments

There was a total of five student teachers working with the children during the course of the investigation. During the first semester, one male student teacher was assigned to the open classroom in the science area. During the second semester, the open classroom had a male student teacher in the social studies area, a female student teacher each in mathematics and English. In the traditional environment,

one of the mathematics classes had a female student teacher during the second semester. All of the student teachers were assigned from the same liberal arts college.

The main area of difference in the teaching personnel was one of diverse personalities and interests. Inability to control this diversity among teachers in the areas of personality and interests has been acknowledged as a limitation of the study.

Summary

To attempt to answer the question of the effect of the open classroom on locus of control, a four-group non-equivalent control group research design of high and low academic achievers in both the open classroom and the control (traditional) classroom environment was employed. Covariance was used to compensate for the lack of randomly assigned subjects. A pretest and a posttest of the Nowicki-Strickland Locus of Control questionnaire were administered. Between the two administrations of this questionnaire, one-half of the subjects received approximately one full school year of instruction in the open classroom and the other half of the subjects in the control environment.

The data collected for the investigation consisted of an Iowa Test of Basic Skills in language and mathematics, SES information based on the Hollingshead Two-Factor Index of Social Position, Otis-Lennon intelligence scores obtained from school records, and a pretest-posttest of the Nowicki-Strickland Locus of Control Scale.

CHAPTER IV

ANALYSIS OF THE DATA

A body of data was collected to establish a basis upon which to conduct this investigation. Data were collected for the four groups after the subjects had been assigned to the two environments. ITBS percentile scores from the testing of the previous year were used in language and mathematics to determine an average in academic achievement for each subject. To establish correlations, a pretest of the Nowicki-Strickland Locus of Control Scale was used at the start of the school year.

Table 4

Pretest Means, Standard Deviations and Sample Sizes of Locus of Control Scores

Group	Mean	S.D.
Open Classroom		
X_1 - High Achievers (N = 50)	11.2	4.1
X_2 - Low Achievers (N = 50)	10.9	5.2
Traditional Classroom		
X_3 - High Achievers (N = 50)	13.8	4.3
X_4 - Low Achievers (N = 50)	14.1	4.8
Total Sample (N = 200)	12.5	4.8

Preliminary Data Collected

The pretest of the Nowicki-Strickland Locus of Control Scale provided the covariate necessary for the research. The results of this pretest were

broken down for the high academic achievers and low academic achievers in both environments. The means and standard deviations for each academic group and for the total sample are shown in Table 4. Both the high and low academic achievers in the open environment, groups X_1 and X_2, show lower means on the pretest of the locus of control scale than the two groups, X_3 and X_4, in the traditional environment.

Data on the socio-economic status (SES) of the subjects were collected through the Hollingshead Two-Factor Index of Social Position.

Table 5

Means, Standard Deviations and Sample Sizes of Socio-Economic Status

Group	Mean	S.D.
Open Classroom		
X_1 - High Achievers (N = 50)	31.54	14.8
X_2 - Low Achievers (N = 50)	33.22	10.7
Traditional Classroom		
X_3 - High Achievers (N = 50)	33.02	14.3
X_4 - Low Achievers (N = 50)	33.44	14.1
Total Sample (N = 200)	32.81	13.5

A mean and standard deviation were obtained for each of the four groups as well as for the entire sample. No statistically significant difference

among the means of the four groups was found. Table 5 contains a summary of the data analysis for each of the four groups and for the complete sample (See Appendix F).

Table 6

Means, Standard Deviations and Sample Sizes of Achievement Scores in Language and Mathematics

Group	Mean	S.D.
Open Classroom		
X_1 - High Achievers (N = 50)	90.2	4.7
X_2 - Low Achievers (N = 50)	74.3	8.8
Traditional Classroom		
X_3 - High Achievers (N = 50)	74.7	9.1
X_4 - Low Achievers (N = 50)	45.8	10.5
Total Sample (N = 200)	71.2	18.5

The percentile scores in language and mathematics of the Iowa Test of Basic Skills were obtained from the school records and pooled for each subject in order to reach an academic achievement average. A mean and standard deviation were computed for each of the four groups and for the entire sample (See Table 6). There was a wide range between the means of the high academic achieving group, X_1, in the open classroom and the low academic achieving group, X_4, in the traditional classroom.

The mean of the low academic achievers, group X_2, in the open classroom and that of the high academic achievers, group X_3, in the traditional classroom, however, showed no statistically significant difference in a t-test (See Appendix F).

Table 7

Means, Standard Deviations and Sample Sizes of Otis-Lennon Intelligence Test Scores

Group	Mean	S.D.
Open Classroom		
X_1 - High Achievers (N = 50)	119.7	8.7
X_2 - Low Achievers (N = 50)	119.9	9.0
Traditional Classroom		
X_3 - High Achievers (N = 50)	115.0	8.4
X_4 - Low Achievers (N = 50)	107.5	7.8
Total Sample (N = 200)	115.5	9.8

Scores on the Otis-Lennon Intelligence Test administered to the entire seventh grade population of the school at the start of the school year by the guidance couselors were obtained for the sample from the school records. Means and standard deviations for the four academic groups are shown in Table 7 (See Appendix F).

Table 8

Pearson Product-Moment Correlation between Locus of Control and SES

Variable	Sum of Scores	Sum of Squares of Scores	Sum of Cross Products	r	z-value
SES (N = 200)	6561	251643	85297	.28*	3.94
Locus of Control (N = 200)	2470	36760			

* $p < .05$

Preliminary Data Analysis

In order to build upon previous research and to include the information in this investigation, correlations were determined between locus of control and certain other variables. A Pearson product-moment correlation was used to examine the relationship between the locus of control and SES, using the Nowicki-Strickland scale and the numerical scores of the Hollingshead Two-Factor Index of Social Position. A correlation of .28 was obtained, and a z-test for significance produced a z-value of 3.94 (See Table 8). The correlation indicates a statistically significant relationship between locus of control and SES and was in line with those found in previous research in the area of SES and locus of control (Graves & Jessor, 1961; Battle & Rotter, 1963; Trowbridge, 1971; Stephens, 1971; Ducette & Wolk, 1972).

To investigate the relationship between locus of control and sex, a point-biserial correlation was used (See Table 9).

Table 9

Point-biserial Correlation between

Locus of Control and Sex

Variable	N	Means of Pretest Scores of Locus of Control	Mean Square	r_{pb}	d/f	t-value
Males	99	12.23	5.56	.03 ns	198	.42
Females	101	12.56				

The resulting r of .03 was tested for significance, using a t-test. At the .05 alpha level this result did not show a statistically significant relationship between locus of control and sex. This finding supported results reported in previous research (Stephens, 1971; Beebe, 1970).

Table 10

Pearson Product-Moment Correlation between

Locus of Control and Academic Achievement in Language and Mathematics

Variable	Sum of Scores	Sum of Squares of Scores	Sum of Cross Products	r	z-value
Achievement (N = 200)	14252	1081127	175979.5	.15*	2.12
Locus of Control (N = 200)	2505	35919			

* $p < .05$

A Pearson product-moment correlation was calculated to analyze the relationship between the pretest scores of the locus of control scale

and the averaged ITBS percentile scores in language and mathematics (See Table 10). A correlation of .15 between the two variables was tested for z-value and found to be statistically significant. The correlation was so low, however, that achievement scores could not be used as a covariate, and the pretest of locus of control was employed instead. The correlation does support the numerous studies that have been made concerning the relationship between locus of control and academic achievement (Crandall, et al., 1965; Coleman, et al., 1966; Shaw & Uhl, 1961; Nowicki, 1973).

Table 11

Posttest Means, Standard Deviations and Sample Sizes on Nowicki-Strickland Scale

Group	Mean	S.D.
Open Classroom		
X_1 - High Achievers (N = 50)	11.0	4.8
X_2 - Low Achievers (N = 50)	10.02	5.2
Traditional Classroom		
X_3 - High Achievers (N = 50)	13.1	5.1
X_4 - Low Achievers (N = 50)	15.6	5.5
Total Sample (N = 200)	12.35	5.6

At the close of the school year a posttest of the Nowicki-Strickland Locus of Control Scale was used. Table 11 shows the mean

and standard deviation obtained on this scale for each of the four academic groups. Means of the scores of the high and low academic achievers, groups X_1 and X_2, in the open classroom environment are lower than the means of the two groups, X_3 and X_4, in the traditional classroom environment.

Table 12

Analysis of Covariance of Locus of Control Scores

Source of Variance	Between	Within	Total
Sum of Squares X	420.5	4128.4	4548.9
Sum of Squares Y	895.7	5359.8	6255.5
Sum of Products	597.7	2702.6	32823
df	3	196	199
Adj. Sum Squares Y	296.5	3590.6	3887.1
Adj. d/f	3	195	198
Variance Estimate	98.8	18.4	
(N = 200)			F = 5.37*

* p <.01

Analysis Plan for the Data

The data collected from the investigation were analyzed using various descriptive and inferential statistical methods. The analysis was designed to answer the basic question of the study:

> Does the open classroom environment produce a higher degree of internal locus of control than the traditional classroom environment?

Because it had not been possible to assign the subjects randomly to the two environments, an analysis of covariance was employed to obtain statistical control of the variable of locus of control in the two treatments. Table 12 shows the data on the analysis of covariance. The covariate, the pretest of locus of control, is denoted as the X value, and the posttest of locus of control scores is denoted as the Y value.

The testing of the hypothesis was accomplished through a comparison of groups X_1 and X_2 with groups X_3 and X_4 in the research design. The first two groups received instruction in the open classroom environment while the latter two received instruction in the traditional classroom environment. An examination of the F ratio for controls revealed an F of 5.37. With degrees of freedom of 3 and 195, this F ratio was statistically significant at the .05 level. The major hypothesis was supported by this finding.

A secondary question to which the research was directed was:

> Do high academic achievers in an open classroom environment show a higher degree of internal locus of control than high achievers in a traditional classroom environment?

Investigation of the hypothesis was made by means of a Scheffé test (Downie & Heath, 1970) of the difference between the means of the locus of control posttest scores between the two groups, X_1 and X_3. Table 13 shows the Scheffé data for the two groups. An examination of the F ratio showed an F ratio of 6.78 with degrees of freedom of 3 and 200. This F ratio is not statistically significant at the .05 level (.05 level = 7.80), and therefore the data does not support the first sub-hypothesis. It is noted, however, that the Scheffé test is

one of the more rigorous of the a posteriori tests. Using the Duncan Multiple-Range Test, an F ratio of 2.24 was computed which is statistically significant at the .05 level (.05 = 2.043) (See Appendix G).

Table 13

Comparison of Means of Posttest Locus of Control Scores between High Academic Achievers

Group	N	Mean	MS	F
Open Classroom				
X_1 - High Achievers (N = 50)	50	10.84	18.4	
Traditional Classroom				
X_3 - High Achievers (N = 50)	50	13.08		6.78 ns

Another secondary question to which the research was directed was:

Do low academic achievers in an open classroom environment show a higher degree of internal locus of control than low academic achievers in a traditional classroom environment?

A comparison of the means of posttest locus of control scores for groups X_2 and X_4 was made, using the Scheffé test (See Table 14). The F ratio of 39.99 obtained was found to be statistically significant at the .01 level, with degrees of freedom of 3 and 200, supporting the second hypothesis.

Table 14

Comparison of Means of Posttest Locus of Control Scores between Low Academic Achievers

Group	N	Mean	MS	F
Open Classroom				
X_2 - Low Achievers	50	10.02	18.4	39.99*
Traditional Classroom				
X_4 - Low Achievers	50	15.46		

* $p < .01$

The research was also directed to the following question:

Do low achievers in the open classroom environment show a higher degree of internal locus of control than high achievers in a traditional classroom environment?

To investigate this sub-hypothesis, the means of the posttest locus of control scores of groups X_2 and X_3 were compared, using the Scheffé test (See Table 15). The F ratio of 12.65 resulting from this test showed a statistically significant difference at the .01 level, with degrees of freedom of 3 and 200. The F ratio supported the third sub-hypothesis.

Table 15

Comparison of Means of Posttest Locus of Control Scores between Low Academic Achievers in Open Classroom and High Academic Achievers in Traditional Classroom

Group	N	Mean	MS	F
Open Classroom				
X_2 - Low Achievers	50	10.02	18.4	12.65*
Traditional Classroom				
X_3 - High Achievers	50	13.08		

* $p < .01$

Summary

The foregoing analysis yields the following results:

1. A product-moment correlation between locus of control and SES produced a statistically significant relationship between locus of control and SES.

2. A point-biserial correlation between locus of control and sex indicated no statistically significant relationship between locus of control and sex.

3. A product-moment correlation between locus of control and achievement produced a statistically significant correlation between the two variables.

4. The open classroom environment showed a statistically significant greater effect on internal locus of control than did the traditional classroom environment.

5. A comparison of the difference between the means of post-test locus of control scores for high academic achievers in both classroom environments did not show a statistically significant difference in degree of internal locus of control, on the Scheffé test, but did show a statistically significant difference on the Duncan Multiple-Range test, with high achievers in the open classroom having a higher degree of internality than high achievers in the traditional classroom.

6. A comparison of the difference between the means of post-test locus of control scores for low academic achievers in both classroom environments showed a statistically significant higher degree of internal locus of control for low achievers in the open classroom environment.

7. A comparison of the difference between the means of the posttest locus of control scores for low academic achievers in the open classroom environment and for high academic achievers in the traditional classroom environment showed a statistically significant higher degree of internal locus of control for the low academic achievers in the open classroom than for the high achievers in the traditional classroom environment.

CHAPTER V

SUMMARY AND CONCLUSIONS

As a means of identifying and assessing learning environments as they relate to the development of student self-direction, a study was designed to measure the degree of internal locus of control of seventh-grade students. The effects of approximately one school year's instruction in the open classroom environment upon internal locus of control were measured in this investigation.

Summary

The research was directed to the following major hypothesis:

Students in an open classroom show a statistically significant higher degree of internal locus of control than students in the traditional classroom.

The three sub-hypotheses which follow were also investigated in this study:

1. High academic achievers in an open classroom environment show a statistically significant higher degree of internal locus of control than high academic achievers in a traditional classroom environment.
2. Low academic achievers in an open classroom environment show a statistically significant higher degree of internal locus of control than low academic achievers in a traditional classroom environment.

3. Low academic achievers in an open classroom environment show a statistically significant higher degree of internal locus of control than high academic achievers in a traditional classroom.

Data were collected on locus of control using the Nowicki-Strickland Locus of Control Scale. Both a pretest and a posttest on this scale were administered. Academic achievement was measured by averages of percentile scores in language and mathematics obtained from ITBS scores in the school records. Intelligence scores on the Otis-Lennon Intelligence Test were also obtained from school records. Socio-economic status was determined through use of the Hollingshead Two-Factor Index of Social Position.

A sample (N = 200) of seventh-grade students previously assigned by the school guidance department to either open or traditional classroom environments was selected from a population of 386 seventh-grade students. Of this sample, one-half of the students (N = 100) had been assigned to the open classroom, and the other half (N = 100) to the traditional classroom as a control group. The open classroom was defined as a learning environment in which the learner assumes through his own interests a large measure of responsibility for his learning and in which the teacher becomes a guide and resource person aiding the learner in his activities. A traditional classroom was defined as a self-contained classroom with one teacher in one academic subject, using a scheduled amount of time to teach a prescribed curriculum with time-honored methods in a teacher-dominated atmosphere.

The sample was divided into four equal academic achievement groups on the basis of the averaged ITBS percentile scores previously obtained. This was done by use of a median split for subjects in both learning environments, and provided an equal group of high academic achievers and an equal group of low academic achievers in both environments. Academic achievement was defined operationally as the average of the percentile scores in language and mathematics in the ITBS test for each student.

All subjects received approximately one school year's instruction in the learning environment to which they had been assigned. An adequate description of the treatment of this length of time was developed for both the open classroom and for the traditional classroom environments.

Discussion

To ascertain the relationship of other variables which had been reported in previous research and to build upon that research in this investigation, statistical correlations were made between locus of control and these variables. The numerical scores of the Hollingshead index were used to establish scores for SES, and a product-moment correlation was made, indicating a statistically significant relationship between locus of control and SES in the sample (Table 8). This finding supported previous studies and determined a relationship of SES to locus of control in the present study. Since, however, the sample was identified as a middle-class socio-economic segment, the correlation was limited to that particular portion of the population.

A product-moment correlation between locus of control and academic achievement was also calculated, resulting in a statistically significant relationship being identified between these two variables (Table 10). This correlation corroborated previous findings concerning the relationship of locus of control and academic achievement. The correlation, however, was low which might have been due to the fact that subtests in language and mathematics were used for the purpose of this study rather than the full ITBS battery. The complete battery or a different battery of standardized achievement tests might have affected the degree of correlation in this study. Research concerning the relationship of work study skills and locus of control in the open classroom environment might produce significant statistical results in further delineating and assessing the role of the open classroom in education and would investigate the implications of Piagetian theory for this learning milieu.

A point-biserial correlation between locus of control and sex showed no significant relationship between these two variables (Table 9). This result supports the previous investigations in the area of locus of control and sex relationship. Investigation into the relationships among academic achievement, sex and locus of control after several school years in the open classroom environment is suggested as an area that might produce significant findings concerning the effect of the open classroom on the relationships of these variables.

An analysis of covariance was used to respond to the major hypothesis, using a pretest locus of control measure as the covariate. The analysis yielded a statistically significant F ratio ($p < .05$), supporting the major hypothesis (Table 12). This study provides an empirical

conclusion in the identification of the open classroom as a learning environment which will affect positively internal locus of control by producing a higher degree of internality. Further studies at different grades are necessary for corroboration of this finding.

A Scheffé test was used to reply to the three sub-hypotheses. For the first of these the F ratio was not statistically significant at the .05 level (Table 13). (The Duncan Multiple-Range Test produced a statistically significant result of 2.24 at the .05 level which did support the first sub-hypothesis.) The second and third sub-hypotheses were supported by statistically significant F ratios at the .01 level (Tables 14 and 15).

The F ratio for high academic achievers in the two environments was lower than for the two groups of low academic achievers or for the cross level of academic achievers in the two groups. Previous studies reporting on internality and academic achievement have found a significant relationship between the two variables which may account for the lower correlation in the high academically achieving groups. The fact that locus of control was statistically significant across levels of achievement appears to support the theory that the open classroom is an effective factor in the development of student self-direction. More statistical support of this finding in a more generalized sample of population is necessary to determine the full impact of this learning environment.

Implications for Research

To more fully identify and assess the value of open classrooms as learning environments, investigations into the various models of

such environments is imperative if research is to provide information to professional educators with which they can reply to society's demands. The diverse areas in the field of open education which need research are so numerous that only some aspects can be noted here.

Since one assumption about the open classroom environment is that it helps to more fully develop the full potential of an individual, then additional research concerning the variables in the open classroom which contribute to such development is necessary. Further investigation of the variables of sex, SES, academic achievement and locus of control included in the present study is needed to delineate the roles these variables have in their relationship to each other in the open classroom and to the development of potential in such an environment. What specific variables, for instance, in the open classroom helped that environment produce a higher degree of internality across levels of academic achievement? What effect on the larger area of self-concept does the open classroom produce? Research in this field can produce needed facts.

It is possible that certain kinds of students respond more positively to learning in the open classroom environment than do other types. Studies to determine if this is so can provide administrators with valuable information for the assignment of students to particular learning environments.

What sort of teachers operate most successfully in the open classroom environment, or is there no difference in the success among teachers in working in the open classroom atmosphere? Factual information can prove invaluable in this aspect of the open classroom.

In the field of curriculum development, studies in the specific skills associated with traditional education are needed. Measures of reading and mathematical skills on all levels of the public schools should be taken, for instance, and analyses should be made to determine the effect of the open classroom environment on these skills. The other academic areas likewise need similar studies. In addition, experimentation with present curricula and departures from them must be subjected to research and analyses.

In terms of the developmental processes of reasoning in children as demonstrated by Piaget in the early 1920's (1970), the impact of the open classroom environment needs to be evaluated. In order to make an evaluation, information provided by research is necessary in the areas of intellect which tend to foster independent learning behavior. Such areas include problem solving, verbal fluency, concept learning and divergent thinking. Divergent thinking, which is a flexible thinking, seeking variety in answers, seeking various directions and with a freedom from conventional logical development (Guilford, 1966), would appear to be one of the prime goals involved in exposing children to the open classroom environment. It seems incumbent upon research to produce findings which educators may use in decisions concerning wider implementation of the open classroom milieu.

Again, accepting the fact that children are both "creatures and creators of the society in which they live" (Guilford, p. 113), the freedom of the open classroom may produce a societal relationship differing from that resulting from the traditional classroom atmosphere. Here again definitive information through investigation would help provide a factual basis for such a conclusion.

The entire area of the intellect and of learning is far too large and complex to be treated in this discussion. The factors of divergent or creative thinking and of societal development are cited as examples of possibilities for research in a field where such possibilities for research of the open classroom are nearly limitless.

Since the only long-range study of open classroom education (Gardner, 1966) is presently being questioned, research covering students exposed to open classroom education over a period of years is called for. The necessity in this area is not only for factual information concerning academic achievement but also for information on the effect of this environment on the characteristics and habits of individuals as a result of such long-term exposure.

The findings of the present investigation applied to one segment of the entire population. Further research in the same area would provide a much wider basis for conclusions concerning the effect of the open classroom as a learning environment.

It is clear that the need exists for more research concerning open classrooms. Evidence is needed to answer the questions about academic achievement, teaching personnel, variables affecting the development of full potential, optimal physical plants, the type of individual best served by the open classroom environment, and, most important, the general success of the open classroom as a learning environment.

Implications for Education

With the change in emphasis from subject matter to the individuals who are receiving education, school administrators and profession-

al educators are focusing on goals to develop the full potential of each student. The necessity of research to provide a factual basis for implementation of new methods is evidenced in the literature concerning educational needs (Rogers, 1971). Societal demands for more effective methods of education are accompanied by parental reluctance to accept departures from traditional instruction. Educators need the statistical facts provided by research to help restructure society's attitude towards radical change. Morecver, with the knowledge which research can provide, the problem of answering criticism of today's traditional education may be met in a positive manner by offering approaches which show scientific evidence of promise of success.

In the implementation of a relatively radical approach like the open classroom educators are faced with many areas in the school systems which must be adapted to such change. Teachers must be trained in the full use of materials, resources, and, above all, in changing their own attitudes about their roles in the classrooms. The Piagetian theory of allowing the child to center his learning around his own interests runs contrary to most of the teacher training methods that have been in use. The necessity of full orientation of teachers includes a complete understanding of ways in which to help a child direct his interests for his own development. Comprehension of the sense a child has of the control of his learning is of value in determining the best ways in which to guide a child. Knowledge in the area of locus of control and of its role in the open classroom environment is part of such understanding.

An open classroom, by virtue of the freedom of choice which students have, is in direct conflict with the stringent demands of a set curriculum. To effect a successful change to open classroom learning environments, educators must examine the curriculum, particularly in the area of its pertinence to the goal of development of an individual's full potential. There appear to be two possibilities of curriculum change. One is to plan a broad spectrum of generalized curriculum goals with the implementation of the means of achieving the goals becoming the student's responsibility. The other possibility is to dispense with a curriculum, allowing each student to develop truly as an individual rather than to be forced into the specific mold which rigid curriculum requirements demand. In the latter instance, students have the opportunity to exercise much more control over the direction of their learning.

The open classroom may not be the best learning environment for all types of students. Should studies confirm this statement, school administrators would be aided in providing better learning and development of all students by using such information in assigning the most suitable learning environment to each student.

In today's culture, however, it is the individual himself who is requiring that he be given the opportunity to reach his own full potential, and it is to him individually, rather than to society as a whole, that the educators must respond primarily. Extreme departures from traditional procedures which have, among other factors, a basis of proven worth offer educators the possibility of providing individuals with answers to their demands.

Obtaining statistical evidence involves numerous studies in multi-areas, making a body of facts available upon which educators can make decisions and judgments. This study has attempted to add a portion of such evidence concerning one means of change in educational methodology. It has also tried, in so doing, to provide educators with part of an answer to the criticisms of present public school instruction as well as to add to the information concerning the value of the open classroom environment in the area of student self-responsibility.

Conclusions

The important points of the foregoing discussion follow:

1. The open classroom environment was found to produce a higher degree of internal locus of control within academic achievement levels and across these levels.
2. The variables of SES and academic achievement showed a statistically significant relationship with locus of control which supported previous research in these areas.
3. No statistically significant relationship between sex and locus of control was found. This supported previous research on these two variables.
4. Studies over a longer time period concerning the effect of the open classroom on the relationship of variables such as locus of control, SES, sex and academic achievement were deemed essential.

5. Investigation into the relationship of work study skills and locus of control in the open classroom environment appears to be warranted in the light of the theories promulgated by Piaget and their implications for the open classroom.

6. The limits of the sample demonstrated the need for a more generalized sample in future studies in order to provide information on a more generalized school population.

7. Among the many areas of open education which call for research, those of isolating relationships of the variables within the framework of this environment appear to be some of the first priorities of research in the field. Examination of the goals of the curriculum in terms of curriculum requirements seems needed. The necessity of identifying the variables in the human element, both in students and in teachers, as such variables are affected by the open classroom approach, offers researchers an opportunity to provide essential information to school administrators.

8. Closely related to the suggestions in the area of research, the recommendations in the area of education involve judgments and decisions as well as the implementation of programs. The identification of variables in the open classroom provides educators with one basis upon which to reach decisions concerning the feasibility of such an approach. Curriculum goals must be clearly defined and broadened. Studies may

help provide the direction such goals should take. Assignment to the optimal learning environment can be a factor in the success of the open classroom approach, and results of studies concerning the relationship of human variables to learning in this environment can offer educators information for this purpose. In addition, a redirection of teacher attitudes towards learning in the open environment, and the re-education of teachers in the role of the teacher in the open classroom, appear necessary.

The support provided by research offers important evidence to school administrators and professional educators. Such evidence can be of aid in making decisions concerning the value of the open classroom as an answer to the criticisms and demands of society.

APPENDIX A

Ranges and Medians of Average ITBS Percentile Scores in Language and Mathematics

Group	Range	Median
Open Environment (N = 100)	44.5-99	84.5
Traditional Environment (N = 100)	19-93.5	60.5

APPENDIX B

Distribution of SES Classes on Hollingshead Index

Group	Classes					Total
	I	II	III	IV	V	
Open	14	21	43	22	0	100
Traditional	15	25	36	24	0	100

Two-Factor Index of Social Position

A. B. Hollingshead

Hollingshead's Two-Factor Index of Social Position is predicated on two assumptions: that occupation reflects the skill and power an individual possesses as he performs in society, and that education reflects an individual's knowledge and cultural tastes.

He has constructed a scale upon which the occupation fits into one of seven major categories which range from high executives (Superior Court judges, directors of large businesses, etc., for example) to unskilled employees (woodchoppers, window cleaners, for example). Each of these categories has a numerical value assigned to it. The amount of education an individual has had also can fit into one of seven categories, and each of these categories has an assigned value.

To determine the socio-economic numerical standing of an individual, on this scale, his occupational numerical value is multiplied by a factor weight of 7, and his educational numerical value is multiplied by a factor weight of 4. These scores are then added.

Hollingshead lists the following SES classes and the numerical range of each as follows:

SES Class	Range of Computed Scores
I	11-17
II	18-27
III	28-43
IV	44-60
V	61-77

APPENDIX C

Nowicki-Strickland Questionnaire

(Y) 1. Do you believe that most problems will solve themselves if you just don't fool with them?

(N) 2. Do you believe that you can stop yourself from catching a cold?

(Y) 3. Are some kids just born lucky?

(N) 4. Most of the time do you feel that getting good grades means a great deal to you?

(Y) 5. Are you often blamed for things that just aren't your fault?

(N) 6. Do you believe that if somebody studies hard enough he or she can pass any subject?

(Y) 7. Do you feel that most of the time it doesn't pay to try hard because things never turn out right anyway?

(Y) 8. Do you feel that if things start out well in the morning that it's going to be a good day no matter what you do?

(N) 9. Do you feel that most of the time parents listen to what their children have to say?

(Y) 10. Do you believe that wishing can make good things happen?

(Y) 11. When you get punished does it usually seem it's for no good reason at all?

(Y) 12. Most of the time do you find it hard to change a friend's (mind) opinion?

(N) 13. Do you think that cheering more than luck helps a team to win?

(Y) 14. Do you feel that it's nearly impossible to change your parent's mind about anything?

(N) 15. Do you believe that your parents should allow you to make most of your own decisions?

(Y) 16. Do you feel that when you do something wrong there's very little you can do to make it right?

(Y) 17. Do you believe that most kids are just born good at sports?

(Y) 18. Are most of the other kids your age stronger than you are?

(Y) 19. Do you feel that one of the best ways to handle most problems is just not to think about them?

(N) 20. Do you feel that you have a lot of choice in deciding who your friends are?

(Y) 21. If you find a four leaf clover do you believe that it might bring you good luck?

(N) 22. Do you often feel that whether you do your homework has much to do with what kind of grades you get?

(Y) 23. Do you feel that when a kid your age decides to hit you, there's little you can do to stop him or her?

(Y) 24. Have you ever had a good luck charm?

(N) 25. Do you believe that whether or not people like you depends on how you act?

(N) 26. Will your parents usually help you if you ask them to?

(Y) 27. Have you felt that when people were mean to you it was usually for no reason at all?

(N) 28. Most of the time, do you feel that you can change what might happen tomorrow by what you do today?

(Y) 29. Do you believe that when bad things are going to happen they just are going to happen no matter what you try to do to stop them?

(N) 30. Do you think that kids can get their own way if they just keep trying?

(Y) 31. Most of the time do you find it useless to try to get your own way at home?

(N) 32. Do you feel that when good things happen they happen because of hard work?

(Y) 33. Do you feel that when somebody your age wants to be your enemy there's little you can do to change matters?

(N) 34. Do you feel that it's easy to get friends to do what you want them to?

(Y) 35. Do you usually feel that you have little to say about what you get to eat at home?

(Y) 36. Do you feel that when someone doesn't like you there's little you can do about it?

(Y) 37. Do you usually feel that it's almost useless to try in school because most other children are just plain smarter than you are?

(N) 38. Are you the kind of person who believes that planning ahead makes things turn out better?

(Y) 39. Most of the time, do you feel that you have little to say about what your family decides to do?

(N) 40. Do you think it's better to be smart than to be lucky?

(Y) indicates an expected yes answer

(N) indicates an expected no answer

APPENDIX D

Sample of

Learning Activity Package

The Metric System

Lap #1: Introduction

Name _____

Over the next ten years, the United States will gradually convert from the English system of measure to the metric system. Although the metric system is a much simpler system, using three basic units and powers of ten, you have become used to using the more difficult English system with its multitude of units and equivalencies. Think how difficult it was when you first learned:

1 foot = 12 inches 36 inches = 1 yard 5280 feet = 1 mile,

and tried to convert from one unit to another. However, you have become used to the "difficult" system, and it is more familiar to you. But you must change, for your children will speak to you of buying liters of milk, meters of cloth, or grams of candy.

The easiest way to begin thinking in the metric system is to go back to the way you thought of measure as a small child—a ball was small enough to hold in your hand, your father was bigger than you, your cat was smaller than you. Then you began to relate to more specific distances—your friend's house was closer than your school, your father was heavier than you. About this point in

learning, confusion begins to set in, when children begin to become aware of units that are not directly related to themselves—bigger does not always mean older, heavier does not always mean larger.

To avoid some of this confusion with the metric system, we will begin just as you began to learn the English system, by comparing things to you. The meter is about the length from your outstretched arm to your chin.

Measure the following things in meters using "your" meter to the nearest meter. (NO FRACTIONS, PLEASE.)

1. the length of the desk _____meters
2. yourself _____meters
3. the length of a blackboard _____meters
4. a pencil _____meters

Now, confusion should have begun to set in on your first grade mind. The problem: The meter is too large to measure some things, so we will add a smaller measure. The span of your hand would be useful. There are about 10 spans in your meter so we will use the prefix deci—meaning one-tenth to name this unit a decimeter, one-tenth of a meter. Use this to measure:

1. the length of your desk _____decimeters
2. yourself _____decimeters
3. the length of a blackboard _____decimeters
4. a pencil _____decimeters

This unit is said to be more precise than the meter unit. Compare your height in meters and decimeters.

height = _____meters _____decimeters

What is meant by more precise? _____

_____

_____

If your pencil is new, the decimeter is a good unit to measure it. However, if you used the same pencil for a few weeks, without losing it, would the decimeter still be a good measure? Why or why not? _____

_____

_____

We shall introduce a third unit which is about the length of the last joint in your thumb. Because there are about ten of these "thumbs" in your "span," it is about 1/10 of a span, or 1/10 of 1/10 of a meter. This equals 1/100 of a meter so it is given the name centimeter. Why? _____

_____

_____

Now, measure in centimeters:

1. the length of the desk _____centimeters
2. the length of your pencil _____centimeters
3. the size of this paper length _____centimeters
   width _____centimeters
4. the heighth of the desk _____centimeters

I. Of the three units that you now know, which would be best to measure:

1. the distance from home to school _____
2. the size of a ball of string _____
3. the height of a wall _____
4. the width of a book _____
5. the length of your shoe _____
6. the size of a button _____
7. the size of your yard _____
8. the height of a cat _____
9. the height of an elephant _____

II. State what unit fits best with the numeral given:

1. Mr. Raleigh's height 17 _____ 1.7 _____
2. Mr. Amore's circumference 72 _____
3. the width of Mrs. Stone's pocketbook 26 _____
4. the depth of papers on Mrs. Souther's desk 46 _____
5. the distance from Winman to Apponaug 1600 _____

160000 _____

Suggestions you may need for English:

1. How many words can you find with meter? What do these words mean? How many sentences can you make up using these words? What words do you like best? Why?

2. Will you draw me a road map from Rennes, France to Paris, France, and let me know the distances on each route I have to use. Be sure the distances are just the sort I'd get in France. Maybe you'd have a better idea of showing this than by drawing a map. Let's talk it over if you plan to do this.

3. Are the words for centimeter, millimeter and decimeter in other languages similar to English? How many in other languages can you find from asking other students or people you know? It would be fun to see if we could challenge the lunch time groups to figure them out. What suggestions do you have about this idea?

4. Say these words to yourself and to others: decimeter, centimeter, millimeter, meter. Give you an idea?

5. "Did you hear the one about the little centimeter———?" I'm sure our joke-producers will come through on this subject. It's a natural for them!

6. You will probably come up with much better thoughts than these. See me if you need help.

From: Social Studies

CLUES

Not very, very long ago I watched on television a program about mountain-climbing. It was sort of unusual because, you see, the climbers weren't really going up a mountain. Instead, they were climbing up the side of a very tall building in Tokyo.

Another time, too, I saw the same type of program. On this program the climbers went up the outside of the Eiffel Tower.

If both of these programs were held at the same time of year, would there be a difference in the average weather for that time of year? Where were these programs held, anyhow? Weren't there any mountains in these countries for climbing? How many geographical differences between the two countries show up by looking at maps? For those of you who have been reading about Sherlock Holmes, see how good you are at finding these differences.

Anyone for giving us an idea of the cities in these two programs?

In the metrical system, how tall is the Eiffel Tower? Do we have any buildings the same height? What is the height of the tallest building in Rhode Island? What questions did I forget to ask?

APPENDIX E

Means, Standard Deviations and Sample Sizes of Locus of Control Pretest Scores, Socio-Economic Status, Academic Achievement Scores in Language and Mathematics, and Otis-Lennon Intelligence Test Scores

Group	Locus of Control		Socio-Economic Status		Academic Achievement in Language & Mathematics		Otis-Lennon Intelligence Test	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Open Classroom								
X_1 - High Achievers (N = 50)	11.2	4.1	31.54	14.8	90.2	4.7	119.7	8.7
X_2 - Low Achievers (N = 50)	10.9	5.2	33.22	10.7	74.3	8.8	119.9	9.0
Traditional Classroom								
X_3 - High Achievers (N = 50)	13.8	4.3	33.02	14.3	74.7	9.1	115.0	8.4
X_4 - Low Achievers (N = 50)	14.1	4.8	33.44	14.1	45.8	10.5	107.5	7.8
Total Sample (N = 200)	12.5	4.8	32.81	13.5	71.2	18.5	115.5	9.8

APPENDIX F

Significance Tests for Variables of SES, Sex and Academic Achievement

Group	Test	Result
SES	chi-square	.66 ns
Sex	chi-square	1.44 ns
Academic Achievement (Open Classroom versus Traditional Classroom)	t-test	.23 ns

The reported scores on the Otis-Lennon Intelligence Test fall within the same stanine, the basis for academic placement used in the sample.

APPENDIX G

Duncan Multiple-Range Test of High Achievers

Group	Mean	Standard Error of Means	k	R	Difference between Means
Open Classroom					
X_1 - High Achievers (N = 50)	10.84	.737	2.772	2.04	2.24*
Traditional Classroom					
X_3 - High Achievers (N = 50)	13.08				

* $p < .05$

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